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(54) RESIN COMPOSITION, ITS FILM AND ITS CURED PRODUCT

(57)Abstract:

PROBLEM TO BE SOLVED: To obtain a resin composition, film and its cured product developable with water, a dilute alkaline aqueous solution or an organic solvent, giving excellent pattern accuracy, leaving little organic residue after incineration and useful e.g. as a color filter having high adhesivity.

SOLUTION: This resin composition contains (A) a resin containing an unsaturated group and produced by reacting (a) an epoxy resin having  $\geq 2$  epoxy groups in one molecule with (b) a compound having one unsaturated double bond and one carboxyl group in one molecule and optionally (c) a saturated monocarboxylic acid and optionally reacting the resultant epoxy (meth)acrylate with (d) a polybasic acid anhydride, (B) a diluent, (C) a photo-polymerization initiator, (D) an inorganic pigment and (E) glass powder.

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CLAIMS

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[Claim(s)]

[Claim 1] As an epoxy resin (a) which has at least two or more epoxy groups in a molecule, a compound (b) which has partial saturation duplex association and every one carboxyl group in 1 molecule, and an arbitration component Partial saturation radical content resin to which a polybasic acid anhydride (d) was made to react if needed [ epoxy (meta) acrylate and if needed ] which are a reactant with saturation monocarboxylic acid (c) (A), A resin constituent characterized by containing a diluent (B), a photopolymerization initiator (C), an inorganic pigment (D), and glass powder (E).

[Claim 2] A resin constituent according to claim 1 for color filters.

[Claim 3] A film which consists of claim 1 and a resin constituent given in two.

[Claim 4] A hardened material of claims 1 and 2 and a resin constituent given in three.

[Claim 5] A color filter which calcinates a hardened material according to claim 4, and is obtained.

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**DETAILED DESCRIPTION**

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[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] This invention is suitably used in manufacturing processes, such as a color filter used for a plasma display, a fluorescent indicator tube, etc., and relates to the resin constituent which forms a color filter etc., its film, its hardened material, and baking molding by calcinating at 400-1000 degrees C after the development by exposure by ultraviolet rays, water, or the rare ant potash aqueous solution.

[0002]

[Description of the Prior Art] In recent years, in order to optimize the luminescence property in spontaneous light type displays, such as a plasma display, the method which uses a color filter is examined. For a certain reason, it being exposed to discharge space or being heated with discharge also needs to constitute this color filter from high minerals of robustness. Then, although what forms a color filter by printing and calcinating the paste which consists of an inorganic pigment and low melting glass by screen-stencil etc. is known, it cannot respond to high density and thin line patternizing. Then, although the photograph process using a photopolymer was examined, high-sensitivity[ highly-minute-izing and ]-izing was difficult.

[0003]

[Problem(s) to be Solved by the Invention] The resin constituent of this invention improves the above-mentioned defect, and creation of a minute pattern is possible for it at high sensitivity, it develops it in water or an alkali aqueous solution after hardening by ultraviolet rays, and the resin constituent which forms a good color filter etc., and its hardened material are offered.

[0004]

[Means for Solving the Problem] This invention As an epoxy resin (a) which has at least two or more epoxy groups in [1] molecule, a compound (b) which has partial saturation duplex association and every one carboxyl group in 1 molecule, and an arbitration component Partial saturation radical content resin to which a polybasic acid anhydride (d) was made to react if needed [ epoxy (meta) acrylate and if needed ] which are a reactant with saturation monocarboxylic acid (c) (A), A resin constituent characterized by containing a diluent (B), a photopolymerization initiator (C), an inorganic pigment (D), and glass powder (E), A film which consists of a resin constituent a resin constituent of the above-mentioned [1] publication for [2] color filters, [3] above [1], and given in [2], It is related with a resistor which calcinates a hardened material of a resin constituent [4] above [1], [2], and given in [3], and a hardened material given in [5] above-mentioned [4], and is obtained, a conductor, a fluorescent substance, and a septum.

[0005]

[Embodiment of the Invention] Hereafter, this invention is explained to details. The resin (A) used by this invention is resin which make a saturation carboxylic acid (c) react the compound (a) which has two or more epoxy groups in 1 molecule, the compound (b) which has partial

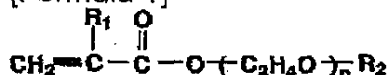
saturation duplex association and every one carboxyl group in 1 molecule, and if needed, and a polybasic acid anhydride (d) is made to react if needed, and is obtained.

[0006] As an example of a compound (a) of having two or more epoxy groups in 1 molecule for example, the bisphenol A mold epoxy resin (for example, the product made from oil-ized Shell Epoxy --) Epicoat 828, Epicoat 1001, Epicoat 1002, Epicoat 1004 grade, the epoxy resin (an example --) obtained by the reaction of the alcoholic hydroxyl group of the bisphenol A mold epoxy resin, and epichlorohydrin The Nippon Kayaku Co., Ltd. make, NER-1302, weight per epoxy equivalent 323, 76 degrees C of softening temperatures, Bisphenol female mold resin (an example, the product made from oil-ized Shell Epoxy, Epicoat 807, EP-4001, EP-4002, EP-4004 grade), the epoxy resin (an example --) obtained by the reaction of the alcoholic hydroxyl group of a bisphenol female mold epoxy resin, and epichlorohydrin The Nippon Kayaku Co., Ltd. make, NER-7406, weight per epoxy equivalent 350, 66 degrees C of softening temperatures, a bisphenol smooth S form epoxy resin and biphenyl glycidyl ether (an example --) the product made from oil-ized Shell Epoxy, YX-4000, and a phenol novolak mold epoxy resin (an example --) The Nippon Kayaku Co., Ltd. make, EPPN-201, the product made from oil-ized Shell Epoxy, EP-152, EP-154, the Dow Chemical Co. make, DEN-438, a cresol novolak mold epoxy resin (an example, Nippon Kayaku Co., Ltd., and EOCN-102S --) EOCN-1020, EOCN-104S, and triglycidyl isocyanurate (the product made from Nissan Chemistry --) TEPIC and a tris phenol methane mold epoxy resin (the Nippon Kayaku Co., Ltd. make --) EPPN-501, EPN-502, EPPN-503, and a fluorene epoxy resin (an example --) The Nippon Steel Chemical Co., Ltd. make, a cardo epoxy resin, ESF-300, cycloaliphatic epoxy resin (the Daicel Chemical Industries, Ltd. make, SEROKI side 2021P, the SEROKI side EHPE), etc. are mentioned.

[0007] A copolymerization mold epoxy resin is mentioned as other examples of (a). As an epoxy resin of a copolymerization mold, for example Glycidyl (meta) acrylate, (Meta) the compound which has an epoxy group and every one ethylene nature partial saturation radical in 1 molecules, such as acryloyl methyl cyclohexene oxide and vinyl cyclohexene oxide, and 1 organic-functions ethylene nature partial saturation radical content compounds other than these (for example, methyl (meta) acrylate --) Ethyl (meta) acrylate, butyl (meta) acrylate, 2-hydroxyethyl acrylate, 2-hydroxypropyl (meta) acrylate, an acrylic acid (meta), styrene, phenoxy ethyl (meta) acrylate, benzyl (meta) acrylate, alpha methyl styrene, glycerol monochrome (meta) acrylate, a general formula (1)

[0008]

[Formula 1]



[0009] The copolymer which a kind chosen out of (for the inside R1 of a formula hydrogen or an ethyl group, and R2 are hydrogen or the alkyl group of C1-C6, and n is the integer of 2-23) or two sorts or more were made to react, and was obtained is mentioned. Specifically, the Nippon Oil & Fats Co., Ltd. make, CP-15, CP-30, CP-50, CP-20SA, CP-510SA, CP-50S, CP-50M, CP-20MA, etc. are illustrated. It is [0010] to which alkoxy polyethylene-glycol (meta) acrylate, such as polyethylene-glycol monochrome (meta) acrylate, such as for example, diethylene-glycol monochrome (meta) acrylate, triethylene glycol monochrome (meta) acrylate, and tetraethylene glycol monochrome (meta) acrylate, methoxy diethylene-glycol monochrome (meta) acrylate, methoxy triethylene glycol monochrome (meta) acrylate, and methoxy tetraethylene glycol monochrome (meta) acrylate, etc. is mentioned as a compound of \*\*\*\* (1). As for the molecular weight of the above-mentioned copolymerization mold epoxy resin, about 1000-200000 is desirable. To the partial saturation monomer whole quantity used for a copolymerization mold epoxy resin, 10 - 70 % of the weight is desirable especially desirable,

and the amount of the compound used which has an epoxy group and every one ethylene nature partial saturation radical in 1 molecule is 20 - 50 % of the weight.

[0011] When obtaining with water the type copolymerization mold epoxy resin in which development is possible, as for the compound of glycerol monochrome (meta) acrylate and/or a general formula (1), it is desirable to blend 50 % of the weight or more preferably especially 30% of the weight or more to the partial saturation monomer whole quantity used for a polymer.

[0012] Said copolymerization mold epoxy resin is obtained with a well-known polymerization method, for example, solution polymerization, emulsion polymerization, etc. If the case where solution polymerization is used is explained, the polymerization of the ethylenic unsaturated monomer mixture will be carried out by the method of adding a polymerization initiator in an organic solvent [ \*\*\*\* ], and carrying out heating stirring at 50-100 degrees C preferably under a nitrogen air current. As said organic solvent, for example Ethanol, propanol, isopropanol, Alcohols, such as a butanol, isobutanol, 2-butanol, a hexanol, and ethylene glycol, Aromatic hydrocarbon, such as ketones, such as a methyl ethyl ketone and a cyclohexanone, toluene, and a xylene Carbitols, such as cellosolves, such as cellosolve and butyl cellosolve, carbitol, and butyl carbitol Propylene glycol alkyl ether, such as propylene glycol methyl ether PORIPIRO pyrene glycol alkyl ether, such as dipropylene glycol methyl ether Lactate, such as acetic ester, such as ethyl acetate, butyl acetate, a cellosolve acetate, and propylene glycol monomethyl acetate, ethyl lactate, and butyl lactate, and dialkyl glycol ether are mentioned. An organic solvent [ being carried out ] is made [ independent or mixing and using, or ].

[0013] As a polymerization initiator, azo compounds, such as peroxides, such as a benzoyl peroxide, and azobisisobutyronitril, can be used, for example.

[0014] As a compound (b) which has partial saturation duplex association and every one carboxyl group in 1 molecule, the half ester which is the reactants (for example, a non-succinic acid, a maleic anhydride, phthalic anhydride, tetrahydro phthalic anhydride, hexahydro phthalic anhydride, etc.) of the acid anhydride of an acrylic acid (meta), and a hydroxyl-group content (meta) acrylate (for example, 2-hydroxyethyl (meta) acrylate, 2-hydroxypropyl (meta) acrylate, 1,4-butanediol monochrome (meta) acrylate, etc.) and a polycarboxylic acid compound is illustrated.

[0015] As an example of saturation monocarboxylic acid (c), an acetic acid, a propionic acid, pivalate, hydroxy pivalate, dimethylol propionic acid, a benzoic acid, a hydroxybenzoic acid, etc. can be mentioned, for example.

[0016] It is desirable that a compound (b) and the saturation monocarboxylic acid (c) as an arbitration component make 0.5-1.1Eq react to 1Eq of epoxy groups of the above-mentioned epoxy resin (a). A reaction solvent may be used if needed. Moreover, for example, ethanol, propanol, Isopropanol, a butanol, isobutanol, 2-butanol, Alcohols, such as a hexanol and ethylene glycol, a methyl ethyl ketone, Aromatic hydrocarbon, such as ketones, such as a cyclohexanone, toluene, and a xylene Carbitols, such as cellosolves, such as cellosolve and butyl cellosolve, carbitol, and butyl carbitol Propylene glycol alkyl ether, such as propylene glycol methyl ether PORIPIRO pyrene glycol alkyl ether, such as dipropylene glycol methyl ether Lactate, such as acetic ester, such as ethyl acetate, butyl acetate, a cellosolve acetate, and propylene glycol monomethyl acetate, ethyl lactate, and butyl lactate, and dialkyl glycol ether are mentioned. These organic solvents are made [ independent or mixing and using, or ].

[0017] In order to promote a reaction, it is desirable to add basic compounds, such as triphenyl phosphine, a triphenyl stibine, triethylamine, triethanolamine, tetramethyl ammoniumchloride, and benzyl triethyl ammoniumchloride, 0.1 to 1% in reaction mixture as a reaction catalyst. During a reaction, in order to prevent a polymerization, it is desirable to add polymerization inhibitor (for example, a methoxy phenol, methyl hydroquinone, hydroquinone, phenothiazin,

etc.) 0.05 to 0.5% among reaction mixture. 5 - 40 hours of reaction temperature are [ 90-150 degrees C and reaction time ] desirable.

[0018] The acid anhydride (d) (for example, a non-succinic acid, a maleic anhydride, phthalic anhydride, tetrahydro phthalic anhydride, hexahydro phthalic anhydride, etc.) of a polycarboxylic acid compound can be made to react 0.2-1.0Eq of anhydride radicals preferably to 1Eq of hydroxyl groups of the epoxy (meta) acrylate obtained by doing in this way if needed. 3 - 30 hours of reaction temperature are [ 90-150 degrees C and reaction time ] desirable.

[0019] A diluent (B) is used in this invention. As an example of a component, for example (B) 2-hydroxyethyl (meta) acrylate, 2-hydroxypropyl (meta) acrylate, 1,4-butanediol monochrome (meta) acrylate, Carbitol (meta) acrylate, acryloyl morpholine, hydroxyl-group content (meta) acrylate for example, 2-hydroxyethyl (meta) acrylate and 2-hydroxypropyl (meta) acrylate -- The acid anhydride of 1,4-butanediol monochrome (meta) acrylate etc. and a polycarboxylic acid compound for example, a non-succinic acid, a maleic anhydride, phthalic anhydride, and tetrahydro phthalic anhydride -- Half ester, polyethylene GURIKORUJI (meta) acrylate which are reactants, such as hexahydro phthalic anhydride, Tripropylene GURIKORUJI (meta) acrylate, TORIMECHI rol pro pantry (meta) acrylate, Trimethylol propane PORIETOKISHITORI (meta) acrylate, GURISEN polypropylene POKISHITORI (meta) acrylate, The di(meth)acrylate of epsilon-caprolactone addition product of a hydronalium KISHIBI valine acid neo pen glycol For example, (the Nippon Kayaku Co., Ltd. make, KAYARAD HX-220, HX-620), etc., Pentaerythritol tetrapod (meta) acrylate, the Pori (meta) acrylate of the reactant of dipentaerythritol and epsilon-caprolactone, Dipentaerythritol poly (meta) acrylate, monochrome, or a poly glycidyl compound for example, butyl glycidyl ether and phenyl glycidyl ether -- Polyethylene glycol diglycidyl ether, polypropylene glycol diglycidyl ether, 1, 6-hexanediol diglycidyl ether, diglycidyl hexahydrophthalate, Glycerol poly glycidyl ether, glycerol poly ethoxy glycidyl ether, Trimethylolpropane polyglycidyl ether, trimethylol propane PORIETOKISHI poly glycidyl ether, The epoxy (meta) acrylate which is the reactant of \*\*) and an acrylic acid (meta), The reactant diluent (B-1) of \*\*, and ethylene glycol monoalkyl ether Ethylene glycol dialkyl ether and diethylene-glycol monoalkyl ether acetate Ethylene glycol mono-aryl ether, polyethylene-glycol mono-aryl ether, Ketones, such as an acetone, a methyl ethyl ketone, and methyl isobutyl ketone Aromatic hydrocarbon, such as ester, such as acetic ester and butyl acetate, toluene, a xylene, and benzyl alcohol Propylene glycol monoalkyl ether, dipropylene glycol dialkyl ether, Organic solvents (B-2), such as propylene glycol monoalkyl ether acetate, ethylene carbonate, propylene carbonate, gamma-butyrolactone, and solvent naphtha, can be mentioned. A diluent may be used independently, may mix two or more kinds and may be used.

[0020] As an example of a photopolymerization initiator (C), for example 2, 4-diethyl thioxan ton, 2-chloro KUCHIKI xanthone, an isopropyl thioxan ton, 2-methyl-1-[4-(methylthio) phenyl]-2-morpholinopropane -1, 2-benzyl-2-dimethylamino-1-(4-morpholino phenyl)-1-butanone, A 4-benzoyl-4'-methyl diphenyl sulfide, 2 and 4, 6-trimethyl benzoyl diphenylphosphine oxide, a MIHIRAZU ketone, benzyl dimethyl ketal, 2-ethylanthraquinone, etc. can be mentioned. Moreover, the photopolymerization accelerator (for example, amines, such as N and N-dimethylamino ethyl benzoate ester, N, and N-dimethylamino isoamyl benzoate ester) as an accelerator of these photopolymerization initiator (B) can also be used together.

[0021] As an example of an inorganic pigment (D), particle size is 10 micrometers or less preferably. A zinc white, the white lead, a basic lead sulfate, a lead sulfate, RIPOTON, zinc sulfide, titanium oxide, Antimony oxide, carbon black, acetylene black, lamp black, Bone black, a graphite, iron black, mineral black, cyanine Black, The chrome yellow, zinc yellow, a barium chromate, cadmium yellow, Synthetic Ochre, Ocher, Titanium Yellow, a lead cyanamide, calcium plumbate, the \*\*\*\* chrome yellow, Chrome Vermilion, An iron oxide, umber, permanent Brown FG, Para Brown, a red oxide, A minium, vermilion, cadmium red, cadmium mercury red,

antimony vermilion, Cobalt purple, manganese purple, ultramarine blue, Berlin blue, cobalt blue, cerulean blue, A zaffer, chrome green, zinc green, chrome oxide, kinky thread JIAN, emerald green, cobalt green, zinc sulfide, silicic acid zinc, zinc sulfide cadmium, calcium sulfide, a strontium sulfide, calcium wolframate, etc. can be mentioned. Moreover, these inorganic pigments can also mix two or more sorts.

[0022] As glass powder (E), low melting glass 20 micrometers or less has desirable mean particle diameter. Surface treatment of these glass powder may be carried out by a coupling agent or polymer.

[0023] The resin constituent of this invention can be prepared by dissolving, mixing and kneading each component of (A), (B), (C), (D), and (E). The operating rate of each component can be the following among the resin constituent of this invention (% is weight %). (A) To a constituent, 5 - 60% is desirable especially desirable, and the amount used which + (B-1) + (C) totaled is 10 - 50%. (D) Among a constituent, 40 - 95% is desirable especially desirable, + (E) component is 50 - 90%, and (D) is [ (E of (D) and the ratio of (E)) ] 5 - 95% 5 to 95%. (A) For the amount used with each desirable component occupied in the total quantity of + (B-1) + (C), the amount of the (A) component used is [ the amount of the 5 - (C) component used of the amount of the component (B-1) used ] 5 - 30% 65% 30 to 90%. The amount of the organic solvent (B-2) used can be used at a rate of arbitration for the purposes, such as suitable viscosity control, in order to use the constituent of this invention.

[0024] A leveling agent, a defoaming agent, a coupling agent, polymerization inhibitor, waxes, others, etc. can also be used for the resin constituent of this invention in the range which does not check the engine performance.

[0025] the resin constituent of this invention -- above -- the constituent for resistors, the resin constituent for fluophors, the resin constituent for septa, and a conductor -- it can use as a resin constituent for circuits, and these are applied by the method of screen-stencil, a curtain flow coat, a spray coat, etc. the whole surface on [ various ] substrates (for example, glass, a ceramic, a metal, etc.). Spreading thickness has 0.1 micrometers - desirable 50 micrometers, and especially its 1-10 micrometers are desirable. After prebaking at about 50-250 degrees C by far infrared rays or warm air after spreading if needed and removing an organic solvent, only a portion to carry out patterning exposes ultraviolet rays using the negative mask through ultraviolet rays. As light exposure of ultraviolet rays, it is 10 - 10000 mJ/cm<sup>2</sup>. It is desirable. Next, negatives are developed with the means of a spray etc. with water of 10-60 degrees C of solution temperature, or a dilute-alkali aqueous solution, and subsequently, it calcinates at 400-1000 degrees C for 1 to 24 hours, and a pattern is formed.

[0026] Moreover, when using it as a film, the resin constituent of this invention is applied to a mold releasing film etc. using for example, a wire bar method, a dipping method, a spin coat method, a gravure method, a doctor blade method, etc., and is dried at 50-250 degrees C by far infrared rays or warm air if needed, and a mold releasing film etc. is stuck further if needed. A mold releasing film is stripped at the time of use, it imprints it to a substrate, and forms a pattern by exposure, development, and baking like the above.

[0027]

[Example] Hereafter, examples 1-9 explain this invention. The section expresses the weight section among an example. The resin constituent for color filters was prepared according to the presentation shown in tables 1 and 2. The obtained resin constituent is applied by 10 micrometers (desiccation thickness) of thickness the whole surface on a glass substrate using a guide, after prebaking for 30 minutes at 80 degrees C, a negative film (Rhine/space = 150 micrometers / 150 micrometers) is contacted, and they are 1500 mJ/cm<sup>2</sup> by the ultrahigh pressure mercury lamp. It glared and, subsequently the unexposed section was developed for 2 minutes by spray \*\* 2 kg/cm<sup>2</sup> using the developer (40 degrees C). It calcinated at 500 degrees C after development and among air for 1 hour, and the septum and the fluorescent

substance pattern were formed. The residual pitch in a pattern, development nature, the condition of the pattern after development, and adhesion with the glass substrate after baking were evaluated.

[0028] the round bottom flask which synthetic example 1 (synthetic example of Reactant A) stirring equipment and a cooling pipe attached -- the tris phenol methane mold epoxy resin (Nippon Kayaku Co., Ltd. make, EPPN-503, weight-per-epoxy-equivalent 200, 83 degrees C of softening temperatures) 200 section, the acrylic-acid 72 section, the methyl hydroquinone 0.2 section, and the propylene-glycol-monomethyl-ether acetate 169.1 section -- teaching -- 90 degrees C -- a temperature up -- it dissolved. Subsequently, after having cooled to 60 degrees C, teaching the triphenyl phosphine 1.2 section and making it react at 95 degrees C for 32 hours, taught the tetrahydro phthalic anhydride 112.6 section, it was made to react at 95 degrees C for 15 hours, and the partial saturation radical content polycarboxylic acid resin of the solid content acid number (mgKOH/g) 100 was obtained.

[0029] the round bottom flask which synthetic example 2 (synthetic example of reactant (A)) stirring equipment and a cooling pipe attached -- the copolymerization mold epoxy resin (Nippon Oil & Fats Co., Ltd. make, BUREMMA CP-50M, weight-per-epoxy-equivalent 310, average molecular weight 6000) 310 section, the acrylic-acid 72 section, the methyl hydroquinone 0.3 section, and the propylene-glycol-monomethyl-ether acetate 244.5 section -- teaching -- 60 degrees C -- a temperature up -- it dissolved. Subsequently, after having cooled to 60 degrees C, teaching the triphenyl phosphine 1.8 section and making it react at 95 degrees C for 32 hours, taught the anhydrous amber acid 70 section, it was made to react at 95 degrees C for 15 hours, and the partial saturation radical content polycarboxylic acid resin of the solid content acid number (mgKOH/g) 80 was obtained.

[0030] (Synthetic example of a reactant (A))

The synthetic example 3 glycerol methacrylate 70 section, the glycidyl methacrylate 30 section, the carbitol acetate 100 section, and the benzoyl peroxide 3 section were added, it heated under the nitrogen air current, the polymerization was performed in 75 degrees C for 5 hours, and the polymer solution was obtained 50%. Subsequently, carried out mixed dissolution of this 50% polymer solution 300 section, the acrylic-acid 22.8 section, the methyl hydroquinone 0.16 section, the triphenyl phosphine 0.9 section, and the carbitol acetate 250 section, it was made to react at 95 degrees C for 32 hours, and the reactant solution was obtained. The average molecular weight of a reactant was about 120,000.

[0031] The synthetic example 4 tetraethylene-glycol mono-methacrylate 50 section, the glycidyl methacrylate 25 section, the methyl methacrylate 25 section, the propylene-glycol-monomethyl-ether acetate 100 section, and the azobisisobutyronitril 2 section were added, it heated under the nitrogen air current, the polymerization was performed in 75 degrees C for 5 hours, and the polymer solution was obtained 50%. Subsequently, carried out mixed dissolution of this 50% polymer solution 300 section, the acrylic-acid 19 section, the methyl hydroquinone 0.16 section, the triphenyl phosphine 0.9 section, and the carbitol acetate 250 section, it was made to react at 95 degrees C for 32 hours, and the reactant solution was obtained. The average molecular weight of a reactant was about 80,000.

[0032] The synthetic example 5 methoxy tetraethylene glycol mono-methacrylate 70 section, the glycidyl methacrylate 30 section, the carbitol acetate 100 section, and the benzoyl peroxide 3 section were added, it heated under the nitrogen air current, the polymerization was performed at 75 degrees C for 5 hours, and the polymer solution was obtained 50%. Subsequently, carried out mixed dissolution of this 50% polymer solution 300 section, the acrylic-acid 22.8 section, the methyl hydroquinone 0.16 section, the triphenyl phosphine 0.9 section, and the carbitol acetate 250 section, it was made to react at 95 degrees C for 32 hours, and the reactant solution was obtained. It was the average molecular weight 170,000 [ about ] of a reactant.



[0033]

[A table 1]

table 1 [ ] Fruit \*\* Example 1 2 3 The polymer obtained in the example 1 of 4 composition 15.4 15.4 The polymer obtained in the example 2 of 7.7 composition 15.4 7.7 KAYARAD PEG400DA \*1 7 5 5 KAYARAD(s) DPHA \*2 2 KAYARAD(s) DPCA-60 \*3 2 7 KAYACURE(s) DETX-S \*4 2 2 2 KAYACURE(s) EPA \*5 2 2 2 2 cadmium red 20 20 ultramarine blue 20 20 low melting glass 20 20 20 20 propylene-glycol-monomethyl-ether acetate 15 15 15 15 residual organic substance (wt%) 0.1 0.1 0.05 0.05 Development nature (1% sodium-carbonate aqueous solution) O O O Condition of the pattern after O development O O O O adhesion O O O O [0034]

[A table 2]

table 2 [ ] Fruit \*\* Example 5 6 7 The polymer obtained in the example 3 of 8 composition 22.7 17.0 The polymer obtained in the synthetic example 4 22.8 The polymer obtained in the synthetic example 5 20.0 Diacrylate of tetraethylene glycol diglycidyl ether 2 2 11 8 KAYARAD PEG400DA 75 KAYARAD DPHA(s) 22 KAYACURE DETX-S2 2 2 2 KAYACURE(s) EPA 2 2 22 cadmium red 20 20 ultramarine blue 20 20 low melting glass 20 20 20 20 propylene-glycol-monomethyl-ether acetate 20 20 20 20 residual organic substance (wt%) 0.2 0.3 0.1 0.15 development nature (water) O O O Condition of the pattern after O development O O O O adhesion O O O O [0035] Notes \* 1 KAYARAD PEG400DA: Polyethylene-glycol diacrylate (Nippon Kayaku Co., Ltd. make)

\*2 KAYARAD DPHA: Dipentaerythritol PENTA and hexa acrylate (Nippon Kayaku Co., Ltd. make)

\*3 KAYARAD DPCA-60: Caprolactone denaturation dipentaerythritol hexaacrylate (Nippon Kayaku Co., Ltd. make)

\*4 KAYACURE DETX-S: 2, 4-diethyl thioxan ton (Nippon Kayaku Co., Ltd. make)

\*5 KAYACURE EPA: The Nippon Kayaku Co., Ltd. make, p-dimethylamino ethyl benzoate ester [0036] It applied to the mold releasing film so that the thickness after drying the resin constituent of example 9 example 1 might be set to 30 micrometers, and it dried at 80 degrees C for 30 minutes, and the film was obtained. This film is imprinted to a glass substrate, a negative film is contacted, and they are 1500 mJ/cm<sup>2</sup> by the ultrahigh pressure mercury lamp. It glared and, subsequently the unexposed section was developed for 2 minutes by 2kg/cm<sup>2</sup> of spray \*\* in the sodium-carbonate aqueous solution (40 degrees C) 1%. It calcinated at 500 degrees C after development and among air for 1 hour, and the septum pattern was formed. All of the residual pitch in a pattern, development nature, the condition of the pattern after development, and the adhesion with the glass substrate after baking were O.

[0037] It is 500 degrees C. The weight decrement after 60-minute heating baking : (A part for residual organic ones) With a measurement (development nature): organic solvent system developer It is spray \*\* 2 kg/cm<sup>2</sup> in 40 degrees C of solution temperature. Negatives are developed for 2 minutes. O [ -.... Some or all of a pattern has peeled (by that of the pattern after development). ] evaluated as follows .... \*\* currently developed completely .... x which has residue slightly .... There is a portion which is not developed. Condition : O [ .... A part of pattern portion ] .... A pattern is \*\* currently maintained correctly.... It is x to which the width of face of a pattern is thin. or O which performed : Scotch tape friction test which has all separated (adhesion) .... \*\* which does not separate at all .... a pole part -- x with peeling .... [0038] with many portions of peeling The resin constituent of this invention, a film, and its hardened material have a good pattern precision after development, it excels in development nature and it is [ there is little survival of the organic substance after baking and ] excellent in adhesion so that clearly from the result of examples 1-9 and the example of a comparison.

[0039]

[Effect of the Invention] The resin constituent and film of this invention are alternatively

exposed by ultraviolet rays through the film in which the pattern was formed, and are excellent in development nature in the color filter formation by developing an unexposed portion, and even if the pattern precision after development is good and calcinates at low temperature, there is little survival of the organic substance and it is excellent in adhesion.

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[Translation done.]